



Contribution ID: 59

Type: **not specified**

Search for the critical point in NA61/SHINE

Wednesday 23 October 2024 17:30 (20 minutes)

The NA61/SHINE experiment at the CERN SPS is a multipurpose fixed-target spectrometer for charged and neutral hadron measurements. Its research program includes studies of strong interactions as well as reference measurements for neutrino and cosmic-ray physics. One major goal of its strong interaction program is to determine the existence and pinpoint the location of the QCD critical point, an object of both experimental and theoretical studies.

This contribution will summarize the current status of NA61/SHINE critical point searches in nucleus-nucleus collisions, in the collision energy range $\sqrt{s_{NN}} = 5 - 17$ GeV. The review will include studies of multiplicity and multiplicity-transverse momentum fluctuations, fluctuations of net-electric charge, Bose-Einstein (HBT) correlations in femtoscopy analysis, as well as proton and h^- intermittency. Particular focus will be devoted to the development of novel methods aimed at solving the long-standing problem of bin-by-bin correlations in experimental intermittency analysis, and for a more accurate handling of systematics and uncertainties. Although no clear indication of the critical point has been observed so far, exclusion plots for the parameters of Monte Carlo models will be presented.

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Session Classification: Parallel Session 5